

THE INVENTION CLAIMED IS:

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1. A label switching router that carries out MPLS on an IP network, comprising said label switching router signaling failure to another label switching router having an IP address indicating two or more stages upstream in an LSP, when a signal from a reception link in the LSP is no longer detected.

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2. A label switching router that carries out MPLS on an IP network, comprising a PSL that switches from a working path to a recovery path, the PSL selecting another label switching router having an IP address indicating two or more stages downstream, the other label switching router serving as a PML that receives signals from both the working path and the recovery path.

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3. The label switching router as claimed in claim 2, wherein a control LSP is set up, the control LSP being in a direction opposite to the working path that goes from the

PSL to the PML.

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4. The label switching router as claimed in claim 3, wherein messages transmitted on said control LSP, when switching is to be carried out, comprise a message type, an IP address of a transmitting label switching router, and
10 information about a plurality of the LSPs that are transmitting traffic on the working path that is to be switched.

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5. The label switching router as claimed in claim 2, wherein said LSPs are grouped into a unit for switching from the working path to the recovery path, if said LSPs are
20 passing traffic on the same working path from a specific PSL to a specific PML.

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6. The label switching router as claimed in claim 5, wherein said unit of said LSPs is further divided into groups for every QoS and CoS for switching from the working path to the recovery path, if the QoS and the CoS are set up

in the working path.

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7. The label switching router as claimed in claim 5, wherein the number of said LSPs and identifiers of said LSPs that are to be switched to the recovery path are provided from said PSL to said PML, and the recovery path is
10 set up in a package by receiving a signal from said PML.

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8. The label switching router as claimed in claim 7, wherein the recovery path for a section from said PSL to said PML prepared for said unit assigns a label only for the section using label stacking for forwarding.

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9. The label switching router as claimed in claim 5, wherein a label processing unit stores information
25 concerning said working path and said recovery path such that said PSL is capable of switching traffic to the recovery path, and switching back to the working path.

10. The label switching router as claimed in
claim 5, wherein the label processing unit stores an entry
5 of each of the working path and the recovery path, such that
the label for the recovery path of a frame on the recovery
path, received by the PML, is removed, and mapping to the
working path can be performed.

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11. A restoration and protection method for
carrying out label switching in a label switching network
15 having a plurality of label switching routers, comprising a
step wherein said label switching routers signals failure to
another label switching router having an IP address
indicating two or more stages upstream in an LSP, when a
signal from a reception link in the LSP is no longer
20 detected.

25 12. A restoration and protection method that
realizes MPLS on an IP network, comprising a step wherein a
PSL switches from a working path to a recovery path
selecting another label switching router having an IP
address indicating two or more stages downstream, said other

label switching router serving as a PML that receives signals from both the working path and the recovery path.

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13. The restoration and protection method as claimed in claim 11, further comprising a step wherein a control LSP is set up, the control LSP being in a direction
10 opposite to the working path that goes from PSL to PML.

15 14. The restoration and protection method as claimed in claim 13, further comprising a step wherein messages transmitted on said control LSP, when switching is to be carried out, comprise a message type, an IP address of a transmitting label switching router, and information about
20 a plurality of the LSPs that are transmitting traffic on the working path that is to be switched.

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15. The restoration and protection method as claimed in claim 12, further comprising a step wherein said LSPs are grouped into a unit for switching from the working path to the recovery path, if said LSPs are passing traffic

on the same working path from a specific PSL to a specific PML.

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16. The restoration and protection method as claimed in claim 15, further comprising a step wherein said unit of said LSPs is further divided into groups for every
10 QoS and CoS for switching from the working path to the recovery path, if the QoS and the CoS are set up in the working path.

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17. The restoration and protection method as claimed in claim 15, further comprising a step wherein the number of said LSPs and identifiers of said LSPs that are to
20 be switched to the recovery path are provided from said PSL to said PML, and the recovery path is set up in a package by receiving a signal from said PML.

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18. The restoration and protection method as claimed in claim 17, further comprising a step wherein the recovery path for a section from said PSL to said PML

prepared for said unit assigns a label only for the section using label stacking for forwarding.

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19. The restoration and protection method as claimed in claim 15, further comprising a step wherein a label processing unit stores information concerning said working path and said recovery path such that said PSL is capable of switching traffic to the recovery path, and switching back to the working path.

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20. The restoration and protection method as claimed in claim 15, further comprising a step wherein the label processing unit stores an entry of each of the working path and the recovery path, such that the label for the recovery path of a frame on the recovery path, received by said PML, is removed, and mapping to the working path can be performed.

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21. A router that transmits a label corresponding to an addressed network, receives another label, sets up a

label path by updating a routing table that contains the received label based on the received label, and transmits a packet only with reference to a label that corresponds to a low level header of an IP packet header to the label path,
5 comprising said router transmitting a failure notice to another router that is positioned two or more stages upstream on said label path, when packets are no longer received through said label path.